Let W = weight of injection water per unit of time.
zv = ,, steam condensed ,, „
T_s = steam temperature, degrees Fahrenheit.
$/_t$ = inlet temperature of injection water, degrees Fahrenheit.
t_2 = outlet
L = latent heat in each pound exhaust steam.

Then, W(*$_2$ - /J = *w(L* + T, - f_a),

or W = *<£±IL=J1*

If the heat in the steam supplied to the engine or turbine is known, **and** the work done by the engine or turbine is known per pound of steam used, it is possible to calculate the value of the latent heat L in the exhaust steam, making an allowance of, say, 5 per cent of the heat supplied to the engine for losses by radiation.

Thus, if H_s = heat in each pound of steam at the engine stop-valve, reckoned from water at exhaust temperature,
e = thermal efficiency of engine,
5 per cent = assumed losses by radiation, &c.,

then the latent heat L in each pound of exhaust steam is

H/i - 0-05 - *) = H,(o-95 - <?).

For example, if the steam supply is superheated to 500° F., and the saturation temperature is 360° F., with exhaust temperature 120° F., and thermal efficiency 16 per cent,

Then, from steam tables, H, = 1183 B.Th.U. per pound (from water at 120° F.),
snd L = 1183 (0-95 — 0-16),
= 935 B.Th.U. per pound.

This is based on the assumption that practically all the steam used by the engine passes to the condenser, which, of course, is usually the case in practice.

For approximate calculations it is commonly assumed that i Ib. exhaust steam carries about 1000 B.Th.U. to the condenser as latent heat.

Continuing this example, suppose the injection- water inlet temperature ^ is 76° F., and the outlet temperature of the mixture is 114° F.

Then W(ii4 — 76) = 07(935 + 120 — 114),
W 941

or — = 2±.
w 38

= 24-8 Ib. water per pound steam condensed.